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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/317,056	05/24/1999	YASUTAKA NAKASHIBA	NEYM16.133	8595

7590 07/18/2003  
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EXAMINER

GENCO, BRIAN C

ART UNIT PAPER NUMBER

2615

DATE MAILED: 07/18/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

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# Office Action Summary

Application No.

09/317,056

Applicant(s)

NAKASHIBA, YASUTAKA 

Examiner

Brian C Genco

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on 02 June 2003 is: a) ☐ approved b) ☒ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_.
- ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

Applicant's amendments filed June 2, 2003 have been fully considered by the examiner but are not deemed to be persuasive.

Applicant argues that potential barrier determined by overflow control gate 4 corresponds to the claimed potential barrier.

In response, as broadly as claimed the electric potential barrier need only be any electric potential barrier that excludes surplus charges. While the potential barrier formed under overflow control gate 4 fits this description, examiner notes that the potential barriers formed under gate elements 5 and 8 fit the description as well. The potential barrier under gate element 5 as depicted in Figs. 4A-4G excludes surplus charge built up in the charge collection area as depicted in Fig. 4G. The potential barrier under gate element 8 excludes surplus charge transferred from the charge collection area to the charge transfer area, namely as depicted in Fig. 4E by lowering the potential barrier so that it is deeper than the potential barrier under gate element 5 surplus charge is excluded by not allowing it to be stored in the charge transfer area. Examiner is using the interpretation as originally presented of the claimed potential barrier being that under gate element 8 for the rejection of claims 1, 2, 5, 6, 9, and 10. For claims 3, 4, 7, 8, 11, and 12 Examiner is interpreting the claimed potential barrier as being the potential barrier formed under gate element 5.

### *Drawings*

The corrected or substitute drawings 7-11 were received on June 2, 2003. These corrected drawings are acceptable.

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The proposed drawing correction and/or the proposed substitute sheets of drawing 12, filed on June 2, 2003 has been disapproved because it introduces new matter into the specification. 37 CFR 1.121(f) states that no amendment may introduce new matter into the disclosure of an application. The original disclosure does not support the showing in Fig. 12 of the potential barrier being between the photo-electric conversion unit and the signal read-out portion. As described in the specification and illustrated in Fig. 5 of the present invention the potential barrier is not located between the photo-electric conversion unit and the signal read-out portion as depicted in Fig. 12, but between the photo-electric conversion unit and the vertical overflow drain.

The drawings are objected to under 37 CFR 1.83(a) because they fail to show exactly how the present invention is manipulating the potential barrier and exactly which potential barrier is being manipulated as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance. Examiner again suggests that the applicant supply further timing diagrams modeled after Figs. 5A-5D including how and which potential barrier is manipulated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over (USPN 4,696,021 to Kawahara et al) in view of (Applicant's admitted prior art).

In regards to claim 1 Kawahara et al, herein Kawahara, discloses the claimed "plurality of photo-electric conversion units" (element 1 of Fig. 1A), an "electric potential barrier" controlled by element 8 of Fig. 2B as shown in Figs. 4A-G and created by element 6' of Fig. 2B, and reads out the photo-electric conversion units by grouping them "into a prescribed number of regions," namely 1 region in this case. Kawahara does not disclose "cutting off said incident light by a cut off means such as a mechanical shutter," however, as the applicants admitted prior art discloses the use of a mechanical shutter to cut off incident light before reading out the signal charges (page 3, lines 13-16) for the very well known and established reason of eliminating the continual build up of excess charge by the photo-electric conversion units. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have used applicants admitted use of a mechanical shutter in Kawahara's invention in order to eliminate the continual build up of excess charge by the photo-electric conversion units. As such the combined

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teachings of Kawahara and applicants admitted prior art as a whole teach the claimed method of driving an image sensor, namely cutting off incident light, raising up the potential barrier, and then reading out the signal charges (Figs. 4A-G; column 5, line 3 – column 6, line 47; Kawahara). Note that Kawahara raises the potential barrier controlled by gate 8 from draining off excess charges as shown in Fig. 4B to the potential shown in Fig. 4D during read-out.

In regards to claim 2 applicant admits, on the 4<sup>th</sup> page of the Information Disclosure Statement filed March 14, 2002, that “how much of an overflow barrier OFB potential barrier difference to secure is nothing more than a design matter that can suitably be determined by one skilled in the art according to the properties, etc. of the solid-stage pickup element that is used.” According to this teaching it is only a matter of design choice to increase the potential barrier difference “by a voltage greater than 0.4 V” according to “the properties, etc. of the solid-stage pickup element that is used.”

In regards to claim 9 see examiners notes on the rejection of claim 1. Kawahara discloses a horizontal overflow drain as shown in Figs. 4A-4G under element 2. Examiner notes that the horizontal overflow drain excludes charges by the electric potential barrier in that by having the horizontal OFD potential barrier higher than the transfer gate potential barrier charges build up in the charge transfer area 3 wherein charges exceeding the claimed potential barrier 8 are excluded by being drained over the claimed potential barrier. Examiner notes that the horizontal OFD has a fixed voltage applied to the gate 4 as depicted in Figs. 4A-4G.

In regards to claim 10 see examiners notes on the rejection of claims 2 and 9.

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Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over (USPN 4,696,021 to Kawahara et al) in view of (Applicant's admitted prior art) in further view of (USPN 5,903,021 to Lee et al).

In regards to claim 5 see examiners notes on the rejection of claims 1 and 9. Note that Kawahara does not teach to have a vertical OFD. Applicant's admitted prior art does teach to have a vertical OFD, however there is not motivation to use applicant's admitted vertical OFD in Kawahara's invention. Lee et al, herein Lee, teaches that either a lateral or vertical OFD can be used where in using a vertical overflow drain uses less photodetector area and thus increases the fill factor (column 6, lines 40-56 Lee). Therefore it would have been obvious to one of ordinary skill in the art to have used a vertical OFD in Kawahara's invention instead of a lateral OFD in order to increase the fill factor.

In regards to claim 6 see examiners notes on the rejection of claims 2 and 5.

New grounds of rejection for amended claims 3, 4, 7, 8, 11, and 12 will be presented below.

Claims 3, 4, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over (USPN 4,696,021 to Kawahara et al) in view of (Applicant's admitted prior art).

In regards to claim 3 Kawahara discloses a method for driving a solid-state image pickup device which stores, in a plurality of photo-electric conversion units (e.g., element 1 of Fig. 1A), signal charges corresponding to an incident light during a prescribed time period (e.g., the exposure period), excludes surplus charges by an electric potential barrier (e.g., as depicted in

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Fig. 4G the potential barrier under transfer gate 5 excludes surplus charges built up in the photoelectric conversion device 1), read out, after cutting off said incident light by a cut-off means such as a mechanical shutter (Kawahara does not disclose using a mechanical shutter however as the applicants admitted prior art discloses the use of a mechanical shutter to cut off incident light before reading out the signal charges (page 3, lines 13-16) for the very well known and established reason of eliminating the continual build up of excess charge by the photo-electric conversion units. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have used applicants admitted use of a mechanical shutter in Kawahara's invention in order to eliminate the continual build up of excess charge by the photo-electric conversion units), said signal charges by grouping said photo-electric conversion units into a prescribed number of regions (e.g., one region), and outputs image signal from all of the photo-electric conversion units into a prescribed number of regions (e.g., the vertical transfer regions), and outputs image signal from all of the photo-electric conversion units by repeating the read-out procedures, which comprise the steps of:

cutting off said incident light (e.g., by means of the mechanical shutter);

raising up said electric potential barrier (e.g., as shown in Fig. 4G);

starting reading out said signal charges (e.g., the combined teachings of Kawahara and applicants admitted prior art as a whole teach the claimed method of driving an image sensor, namely cutting off incident light, raising up the potential barrier, and then reading out the signal charges; Figs. 4A-G; column 5, line 3 – column 6, line 47);

wherein said signal charges are read out from said photo-electric conversion units through signal read-out portions (e.g., the potential barrier under gate 5) and the electric potential of said



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electric potential barrier (e.g., the potential barrier under gate 5) during the read-out step is deeper than an electric potential which is applied in signal read-out portion during the times except said read-out step (e.g., Note that examiner is defining the read-out portions and the potential barrier to both be the potential barrier under gate 5 as shown in Figs. 4A-4G. Note that the potential barrier of the vertical transfer gate 5 is deeper in the read-out step depicted in Figs. 4C, 4D, and 4E than in the times except the read-out step, namely Figs. 4A, 4B, 4F, and 4G).

In regards to claim 4 see examiners notes on the rejection of claims 2 and 3.

In regards to claims 11 and 12 see examiners notes on the rejection of claim 9 and claims 3 and 4 respectively.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over (USPN 4,696,021 to Kawahara et al) in view of (Applicant's admitted prior art) in further view of (USPN 5,903,021 to Lee et al).

In regards to claims 7 and 8 see examiners notes on the rejection of claim 5 and claims 3 and 4 respectively.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian C. Genco who can be reached by phone at 703-305-7881 or by fax at 703-746-8325. The examiner can normally be reached on Monday thru Friday 8:00am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on 703-308-9644. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center 2600 customer service office whose telephone number is 703-306-0377.

Brian C Genco  
Examiner  
Art Unit 2615

July 16, 2003



ANDREW CHRISTENSEN  
SUPERVISORY PATENT EXAMINER  
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